

DOCUMENTATION DU VOLTMÈTRE VECTORIEL HP 8405A

FICHE N° 3959

PRÉSERVER
SAUVEGARDER
VALORISER

Période de fabrication : 1950-1974
Fabricant : Hewlett-Packard Company
Domaines : Physique
Sous-domaines : Electronique
Organisme : Université de Rennes
Ville : Rennes
Modèle : HP 8405A
Matériaux : Papier

Description

Cette documentation en anglais, extraite du catalogue Hewlett-Packard de 1970, présente le voltmètre vectoriel HP 8405A. Sur deux pages, elle présente ses caractéristiques principales : gamme de fréquences et de tension, sensibilité, mesure de phase, largeur de bande et spécifications.

Utilisation

Cet appareil était utilisé lors des travaux pratiques par les étudiants de licence et de maîtrise d'électronique dans les années 1970 . Ce voltmètre très performant était capable de mesurer de très faibles signaux (jusqu'à 100 microvolts noyés par le bruit) dans une gamme de fréquence de 1 à 1000 MHz avec une grande sélectivité (1KHz). Pour l'angle de phase, on avait le choix aussi entre plusieurs gammes : $\pm 6^\circ$, $\pm 18^\circ$, $\pm 60^\circ$ et $\pm 180^\circ$ avec une résolution de $0,1^\circ$.

1970 *ELECTRONICS FOR*

MEASUREMENT
ANALYSIS
COMPUTATION

Acoustical Instruments
Automatic Test Systems
Calculators and Peripherals
Communications Test Equipment
Computers and Peripherals
Data Acquisition Systems
DC Power Supplies
Digital Analyzers
Electronic Counters
Frequency and Time Standards
Graphic Recorders
Magnetic Recorders
Meters, Multifunction
Microwave Test Equipment
Network Analyzers
Oscilloscope Systems
Signal Analyzers
Signal Generators
Signal Sources
Spectrum Analyzers

NETWORK ANALYZERS *continued*

360° phase range, 100 μ V sensitivity
8405A Vector Voltmeter

Specifications

Instrument type: two-channel sampling RF millivoltmeter-phase-meter, which measures voltage of two signals and simultaneously displays the phase angle between the two signals.

Frequency range: 1 MHz to 1 GHz in 21 overlapping octave bands (lowest band covers two octaves).

Tuning: automatic within each band. Automatic phase control (APC) circuit responds to the Channel A input signal. Search and lock time, approximately 10 ms.

Isolation between channels:

1 to 300 MHz: greater than 100 dB.
300 to 1,000 MHz: greater than 80 dB.

Maximum ac input: 2 V peak.

Maximum dc input: ± 50 V.

Voltage range (rms):

Channel	1 - 10 MHz	10 - 600 MHz	500 - 1000 MHz
A	1.5 mV - 1.0 V	300 μ V - 10 V	500 μ V - 1.0 V
B	< 20 μ V - 1.0 V	< 20 μ V - 10 V	< 20 μ V - 1.0 V

Range of each channel is extended to 10 V with .1576A 10:1 Divider.

Voltmeter characteristics:

Meter ranges: 100 μ V to 1 V rms full scale is 10-dB steps.

Meter indicates amplitude of the fundamental component of the input signal.

Voltage ratio accuracy:

1 - 200 MHz:

0.2 dB for -60 to 0 dB ranges,
0.5 dB for -70 to +10 dB ranges.

200 - 1000 MHz:

0.2 dB for -60 to -10 dB ranges,
0.5 dB for -70 to 0 dB ranges,
1.5 dB for +10 dB ranges.

Phasemeter characteristics:

Phase range: 360° indicated on zero-center meter with end-scale ranges of ± 180 , ± 60 , ± 18 , and ± 6 .

Meter indicates phase difference between the fundamental components of the input signals.

Resolution: 0.1° at any phase angle.

Meter offset: ± 180 ° in 10° steps.

Phase accuracy: at single frequency ± 1.5 ° (equal voltages at Channel A and B).

Phase jitter vs. Channel B input level

Greater than 700 μ V: typically less than 0.1° p-p.

125 to 700 μ V: typically less than 0.5° p-p.

20 to 125 μ V: typically less than 2° p-p.

Accessories furnished: two 11576A 10:1 Dividers to reduce voltage input 10 to 1; two 10216A Isolators to eliminate errors due to the effects of changing test point impedance; two 10218A BNC Adapters to convert probe tip to male BNC connector; six ground clips for 11576A or 10216A; six replacement probe tips.

Input impedance (nominal): 0.1 M Ω shunted by approximately 2.5 pF; 1 M Ω shunted by approximately 2 pF when 11576A 10:1 Divider is used; 0.1 M Ω shunted by approximately 5 pF when 10216A Isolator is used. AC-coupled.

Residual noise: less than 10 μ V as indicated on the meter.

Bandwidth: 1 kHz.

RFI: conducted and radiated leakage limits are below those specified in MIL-1-6181D and MIL-1-16910C except for pulses emitted from probes. Spectra: intensity of these pulses is approximately 60 μ V/MHz; spectrum extends to approximately 2 GHz. Pulse rate varies from 1 to 2 MHz.

20-kHz IF output (each channel): reconstructed signals, with 20-kHz fundamental components, having the same amplitude, waveform, and phase relationship as the input signals. Output impedance, 1000 Ω in series with 2000 pF; BNC female connectors.

Recorder output:

Amplitude: 0 to approx. ± 1 V dc, open circuit, proportional to voltmeter reading in volts. Output tracks voltage reading within $\pm 0.5\%$ of full scale. Output impedance, 1000 Ω ; BNC female connector.

Phase: 0 to approx. ± 0.5 V dc, open circuit, proportional to phasemeter reading. External load greater than 10,000 Ω affects recorder output and meter reading less than 1%. Output tracks meter reading within $\pm 1.5\%$ of end scale; BNC female connector.

Power: 115 or 230 V $\pm 10\%$, 50 to 400 Hz, 35 W.

Weight: net, 30 lb (13.5 kg). Shipping, 35 lb (15.8 kg).

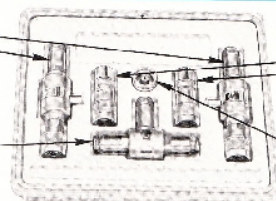
Dimensions: 18 $\frac{3}{4}$ " x 7" x 16 $\frac{3}{4}$ " (467 x 177 x 425 mm).

Price: Model 8405A, \$2850.

Option 02. Linear dB scale uppermost on voltmeter. Add \$25.00.

11536A 50 Ω Tee, with Type N RF fittings, for monitoring signals in 50 Ω transmission line without terminating the line. \$75

11549A Power Splitter, all connectors Type N female (UG-28A/U). \$85



908A Termination, for terminating 50 Ω coaxial systems in their characteristic impedance.

11512A Shorting Plug, Type N male.

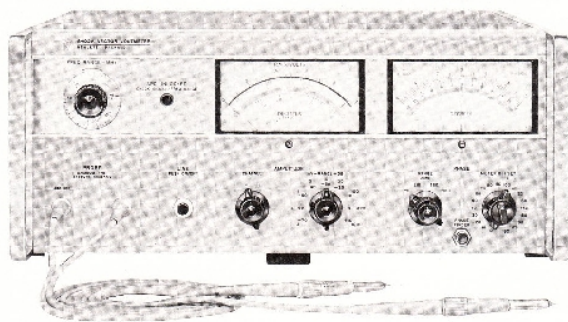
11573A Accessory Kit, required for measurements in 50 Ω systems. \$340

VECTOR VOLTMETER

Accurate voltage and phase measurements,
1-1000 MHz — Model 8405A



NETWORK ANALYZERS



8405A

The HP 8405A Vector Voltmeter measures the magnitude of and the phase difference between two voltage vectors from 1 to 1000 MHz. Since RF voltages have both magnitude and phase, simple voltage measurements tell only half the story. Much circuit design is virtually impossible without phase information; both magnitude and phase data are required to optimize circuit design.

The HP 8405A provides high accuracy and resolution; direct readout, and operating convenience, features which enable you to make RF voltage and phase measurements more easily than ever before. It reduces costs by minimizing equipment requirements, saves time by simplifying measurements, and increases effectiveness by extending capability in the RF range.

1-1000 MHz frequency range

The instrument uses phase-locked coherent sampling to translate 1- to 1000-MHz RF signals to 20-kHz IF signals. The IF signals retain the same wave shapes and the same amplitude and phase relationships as the original RF. Thus, the vector voltmeter's performance is related to what you might expect from a precision laboratory receiver.

Automatic tuning over an octave

You simply rotate a front-panel switch to select any of the 21 overlapping octave ranges which include the input signal frequency, and the automatic phase-locked tuning does the rest. To eliminate guesswork, a front-panel light tells you when the voltmeter is properly tuned. It can then follow slowly drifting signals automatically.

100 μ V F.S. sensitivity, >90 dB dynamic range

Voltages from less than 100 microvolts to 1 volt can be measured on channel B of the 8405A, from less than 500 microvolts to 1 volt on channel A. (Channel A requires the

higher input to operate the automatic tuning). External 10:1 dividers extend channel A and B measurements to 10 volts. Thus, readings can be taken over a 90- to 100-dB range. Either channel A or B voltages are read on a single front-panel meter by simply setting a switch. Both voltage and phase meters have rugged, reliable taut-band suspensions with mirror-backed scales individually calibrated to the meter movement.

The input signals are applied through convenient ac-coupled probes that are permanently attached to the instrument. These probes present a high input impedance (0.1 megohm shunted by 2.5 picofarads) for minimum loading effects when probing. The 10:1 dividers increase input impedance to 1 megohm shunted by 2 picofarads. The ac-coupling in the probes permits you to measure signals as much as 50 volts off ground. Output signals include the 20-kHz signals from each channel plus recorder outputs proportional to phase and amplitude.

360° phase range, 0.1° resolution

Phase is read on a zero-center meter with end-scale ranges of $\pm 180^\circ$, $\pm 60^\circ$, $\pm 18^\circ$, and $\pm 6^\circ$. The $\pm 6^\circ$ scale provides 0.1° resolution, and a meter offset selectable in precise 10° increments permits this resolution to be realized anywhere in the 360° range. Phase accuracy is $\pm 1.5^\circ$ at fixed frequencies and equal signal levels in channels A and B.

High selectivity, 1-kHz bandwidth

Although the sampling system employed in the 8405A results in wide frequency coverage, the actual measurement bandwidth in the 20-kHz IF preceding the voltage and phase measuring sections is only about 1 kHz, affording high selectivity. As a result, measurements are free from errors that might be encountered with a wideband system if signal harmonics or other spurious outputs were present.



Pour nous citer :

Base de la Mission nationale de sauvegarde et de valorisation du patrimoine scientifique et technique contemporain, PATSTEC, Documentation du voltmètre vectoriel HP 8405A (Hewlett-Packard Company), <https://www.patstec.fr/ressources/objets/detail?id=15977>, consulté le 2026-07-28